REMARKS

STATUS OF CLAIMS

Upon entry of this amendment, claims 1-5, 8-17, and 22, and 24-30 will be pending in this application, and are being examined by the Office on the merits. Claims 6, 7, 18-21, and 23 have been canceled without prejudice to, or disclaimer of, their subject matter.

Support for the amendment to claim 1 can be found in claim 23.

OBVIOUSNESS REJECTION

On pages 2-6 of Office action dated December 11, 2008, the Examiner has rejected claims 1-5, 8-17, and 22, and 24-30 under 35 U.S.C. § 103(a) as obvious over U.S. Patent No. 4,869,974 (Oskarsson et al.) in view of U.S. Patent No. 5,445,787 (Friedman et al.). Applicant respectfully traverses this rejection for the reasons given below, and in the response filed on August 29, 2008, which is incorporated herein by reference.

The Office action states:

> With respect to claim 1, Oskarsson et al. ('974) discloses a method for manufacturing composite material parts, wherein the composite material comprises a tough ferrous material (i.e., Fe > 50 wt% as claimed) and a hard material rich in hard constituents (abstract); a powder blank of the composite material is produced by cold isostatic pressing (col. 4, lines 33-38); the blank is extruded (i.e. hotworked) up to an extrusion ratio of at least 6 and the extrusion ratio is defined as the initial area of the body relative to the final area of the body (col. 2, lines 5-26).

Office action dated December 11, 2008 at page 3 (emphasis added).

First, as Applicant has previously explained and as the Office admits, Oskarsson et al. does not disclose the use of hot isostatic pressing (HIP) as recited

in claim 1. The Office attempts to cure this deficiency by citing to Friedman et al., stating:

> Oskarsson et al. ('974) does not disclose that the powder blank is formed by hot isostatic pressing as claimed. However, it would have been obvious to one of ordinary skill in the art at the time the invention was made to substitute the cold isostatic pressing of Oskarsson et al. ('974) with the claimed hot isostatic pressing with expected success, because they are functionally equivalent in terms of densifying powders as disclosed by Friedman et al. ('787) (col. 1, lines 21-47). See MPEP 2144.06.

Office action dated December 11, 2008 at pages 3-4. Friedman et al. use CIP in every figure and in every disclosed embodiment. Nowhere does Friedman et al. describe the use of HIP in their process.

The portion of Friedman et al. specifically referenced by the Office states:

> As is also known, one technique for producing mill products such as rod, sheet and tubing of iron, nickel and cobalt-based alloys is to extrude the metal from powder. For example, as described in U.S. Pat. No. 4,050,143 one known process known as the Anval process uses a metal powder wherein the powder has spherical grains. In addition, the spherical powder is introduced into a thin carbon steel capsule and cold isostatically pressed to a density of over 80 percent and subsequently extruded into tubes, bars and other shapes. The pressing of the powder to a density over 80% is required in order to avoid wrinkling, of the capsule during the extrusion step.
>
> Other processes use hot pressed blanks, for example, using hot isostatic pressing followed by extrusion.
>
> U.S. Pat. No. 4,599,214 describes a method of extruding dispersion strengthened metallic materials in which a billet of dispersion strengthened metallic powdered material comprised of one or more metals and one or more refractory compounds is extruded through a die having an internal contour such that the material is subjected to a natural strain rate which is substantially constant as the material passes through the die. As described, the dispersion strengthened materials are those wherein a hard phase is present with one or more metals. The preferred materials are described as being alloys containing two or more metals.

Friedman et al., column 1, lines 21-47. Nowhere does Friedman et al. state that HIP and CIP are "functionally equivalent in terms of densifying powders" as the Office

incorrectly alleges. Friedman et al. merely shows that HIP can be used prior to extrusion. Friedman et al. also uses CIP prior to extrusion. The most that can be said about the Friedman et al. disclosure is that it shows that HIP and CIP can both be used prior to extrusion. It does not follow, however, that both can be used prior to hot working of the compact. In fact, as Applicant has explained repeatedly, and at length, in at least one previous response, CIP cannot be effectively used prior to hot working by hot rolling, radial forging, or open forging, as recited in Applicant's claims. The two techniques are not, therefore, "functionally equivalent in terms of densifying powders," as the Office alleges, and the Office's citation to Friedman et al. completely fails to support such an assertion.

The use of CIP provides an undensified compact that is totally unsuitable for use in a hot working process. CIP does not create a high density material, but a porous material having weak interfaces between different components of the material. The density change during a CIP process is generally from 55-65% to 75-85%. The resulting composite does not have high strength. CIP cannot, however, provide a compact that can be hot worked as recited in Applicant's claims, because the compact would break up into pieces when hot working methods are applied to it. This is the result of the relatively high porosity of the compact formed by CIP. CIP can, however, be adequate for forming a composite that is to be further worked by extrusion. This is because hot extrusion provides adequate hydrostatic pressure to the CIP compact, when heated strongly before or during extrusion.

HIP, which provides a much denser composite than does CIP, and therefore HIP also provides adequate density for further working by extrusion. However, HIP also provides a compact of adequate density for hot working, e.g., by hot rolling,

radial forging, or open forging. CIP does not. Simple logic compels the conclusion that the ability of CIP and HIP to exceed the minimal densification requirements for an extrusion process does not make the processes "functionally equivalent in terms of densifying powders." This is because an HIP compact can be hot worked by hot rolling, radial forging, or open forging, and a CIP compact cannot be hot worked in this way. The Office's conclusion that CIP and HIP are equivalent defies logic, is untenable, and would clearly constitute reversible error on appeal.

Second, as pointed out above, Friedman et al. discloses the use of CIP in every drawing and in every embodiment described therein. A fair reading of what Friedman et al. teaches one having ordinary skill in this art is to use CIP and extrusion. Thus, even if the teachings of Friedman et al. were combined with the teachings Oskarsson et al., the result would be a process using CIP and extrusion, which is not within the scope of Applicant's claims. Moreover, even if the Office is correct that HIP and CIP are fairly disclosed by Friedman et al. as suitable as preliminary steps prior to extrusion, this is still not Applicant's claimed invention, as extrusion is not hot working, as that term is used in Applicant's claims. In particular, extrusion is not hot rolling, radial forging, or open forging, as recited in claim 1. Again, even if the Office were to combine Friedman et al. and Oskarsson et al., the result is not the Applicant's claimed invention.

Third, the Office admits that Oskarsson et al. is also deficient in that it fails to disclose a wear-resistant component having carbide-forming additives in an amount of 3-20 wt% based on the weight of the wear resistant material. The Office states:

> Oskarsson et al. ('974) does not disclose that the powder mixture contains a total of 3-20 wt% of carbide-forming additives as claimed. <u>However, it is well held that discovering an optimum value of a result-effective variable involves only routine skill in the art.</u> In

> re Boesch, 617 F.2d 272, 205 USPQ 215 (CCPA 1980). In the instant case, the contents of C and Cr (i.e. a carbide forming element in the powder mixture are result effective variables, because they would directly affect the hardness of the material as disclosed by Oskarsson et al. ('974) (col. 3, lines 8-32). Therefore it would have been obvious to one skilled in the art to have optimized the contents of C, Cr and carbide-forming additives of Oskarsson et al. ('974) in order to achieve desired hardness of hard and tough materials and the hardness distribution within the composite material parts. See MPEP 2144.05 II.

Office action dated December 11, 2008 at page 3. The *Boesch* case involved compositional ranges where the claimed ranges overlapped the ranges disclosed in the cited prior art:

> The board agreed with the examiner that the claimed alloys were prima facie obvious from the prior art, noting that there was no substantial disagreement tha both Pohlman et al. and Lamb disclose alloys having compositional limits overlapping those of the claimed alloys.

In re Boesch, 205 USPQ at 218. *Boesch* does not stand for the proposition that it would have been prima facie obvious for a worker having ordinary skill in this art to deviate from the range disclosed in the cited reference, and use a value completely outside of that range. Accordingly, the Boesch decision does not support the Office's assertions that such a modification to Oskarsson et al. and/or Friedman et al. would have been obvious.

CONCLUSION

Applicants submit that this application is in condition for immediate allowance, and an early notification to that effect is respectfully requested. If the Examiner has any questions about this application, or believes that any issues remain to be resolved, the Examiner is respectfully requested to contact the undersigned to arrange for a personal or telephonic interview to resolve these issues prior to the issuance of another Office action.

The Director is hereby authorized to charge any appropriate fees under 37 C.F.R. §§ 1.16, 1.17 and 1.20(d) and 1.21 that may be required by this paper, and to credit any overpayment, to Deposit Account No. 02-4800.

Respectfully submitted,

BUCHANAN INGERSOLL & ROONEY PC

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